

10/760498

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I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO: ATTN: DECISION AND CERTIFICATE OF CORRECTION BRANCH OF THE PATENT ISSUE DIVISION, COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450, ON THE DATE INDICATED BELOW.



BY: Don Marks

DATE: May 5, 2005

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re Patent of: Christophe Moustier et al.

Patent No.: 6,865,028 B2

Issue Date: March 8, 2005

Appln. No.: 10/760,498

Filing Date: January 20, 2004

Title: METHOD FOR CAPTURING  
A PANORAMIC IMAGE BY MEANS  
OF AN IMAGE SENSOR  
RECTANGULAR IN SHAPE

Attorney Docket No.:  
10000-26 (100155 US/WO)

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450  
ATTN: Decision and Certificate of  
Correction Branch of the Patent Issue Division

**Certificate**  
**MAY 13 2005**  
**of Correction**

**REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT**  
**FOR PTO MISTAKE (37 C.F.R. § 1.322(a))**

Attached, in duplicate, is PTO/SB/44 (also Form PTO-1050), with at least one copy being suitable for printing.

It is submitted that the U.S. Patent and Trademark Office is responsible for the errors since the noted errors appear correctly in the substitute specification and claims submitted with the Preliminary Amendment filed with the above-identified application. Inasmuch as the issued patent did not include the substitute claims and the errors are numerous, the substitute claims have been reproduced in their entirety on the PTO/SB/44. Accordingly, no fee should be charged to the patentees or their assignee for the correction.

Issuance of a Certificate of Correction is believed appropriate and is respectfully solicited.

MAY 19 2005

Please send the Certificate to the undersigned.

Respectfully submitted,

May 3, 2005  
(Date)

By: 

**JOHN D. SIMMONS**

Registration No. 52,225

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JDS/DCM  
Enclosures

MAY 19 2005

# UNITED STATES PATENT AND TRADEMARK OFFICE

## CERTIFICATE OF CORRECTION

PATENT NO : 6,865,028 B2  
 DATED : March 8, 2005  
 INVENTOR(S) : Christophe Moustier et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 7, line 50, the formula should read: --  $d(ai') = K_i \alpha I$  --;  
 Column 10, line 5, a new paragraph should start after "ID2";  
 Column 10, line 25, there should be no new paragraph after "Img1";  
 Column 10, line 62, "pair" should read-- part --;  
 Column 11, line 35, "Pd" should read -- Fd --;  
 Column 11, line 58, the second instance of "Imax" should read -- Jmax --;  
 Column 14, line 59, "LA" should read -- L4 --;  
 Column 17, line 26, "dcrmax" should read -- drmax --;  
 Column 18, line 15, " $\alpha_1, \alpha_2, \alpha_3, \alpha=\eta^\circ$ " should read --  $\alpha_1, \alpha_2, \alpha_3, \alpha=90^\circ$  --;

In the claims:

Column 21, starting at line 22, please delete the claims in their entirety and replace with the following:

1. A method for capturing a digital panoramic image comprising:  
 projecting a panorama onto an image sensor by means of a fish-eye objective lens  
 having a constant field angle relative to its optical axis, the image sensor being rectangular in  
 shape,

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the fish-eye objective lens being provided to project onto the image sensor, without reducing the field of view, a distorted panoramic image which is not in the shape of a disk and which covers a number of pixels on the image sensor higher than the number of pixels that would be covered by a conventional image disk.

2. The method according to claim 1, wherein the fish-eye objective lens has an image point distribution function that varies according to axes perpendicular to the optical axis of the objective lens, and which has a minimum spreading rate of the image along a first axis perpendicular to the optical axis and a maximum spreading rate of the image along at least a second axis perpendicular to the optical axis, such that the image projected onto the image sensor is expanded along the second axis.

3. The method according to claim 2, wherein the first and the second axes of the objective lens are perpendicular and the image projected by the objective lens onto the image sensor is ellipsoidal in shape.

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4. The method according to claim 3, wherein the image sensor is arranged relative to the first and second axes of the objective lens so that the major axis of the ellipsoidal image coincides with an effective length of the image sensor.

5. The method according to claim 3, wherein the image sensor is arranged relative to the first and second axes of the objective lens so that the major axis of the ellipsoidal image coincides with a diagonal of the image sensor.

6. The method according to claim 2, wherein the objective lens has a distribution function that is not linear and that has a maximum divergence of at least  $\pm 10\%$  compared to a linear distribution function, such that the projected image has at least one substantially expanded zone and at least one substantially compressed zone.

7. The method according to claim 1, wherein the fish-eye objective lens comprises a combination of a group of lenses provided to capture a panoramic image according to a determined field angle and at least one cylindrical lens having an axis of revolution perpendicular to the optical axis of the objective lens.

8. A method for displaying on a screen an initial panoramic image captured in accordance with the method according to claim 1, the method comprising:  
correcting the distortions of the initial image.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

9. The Method according to claim 8, wherein the correction step comprises transforming the initial image into a corrected digital image in the shape of a disk, the diameter of the corrected image being chosen so that the corrected image comprises a number of image points higher than the number of pixels of the image sensor covered by the initial image.

10. The method according to claim 9, wherein the initial image is ellipsoidal in shape and the corrected image has a diameter the size in number of pixels of which is at least equal to the size in number of pixels of the major axis of the initial ellipsoidal image.

11. The method according to claim 8, further comprising:

projecting, onto the initial image, image points of an image sector to be presented on the screen,

allowing the colors of the image points of the image sector to be presented on the screen to be determined,

wherein the step of projecting the image points of the image sector onto the initial image is performed by means of a distribution function representative of the optical properties of the fish-eye objective lens, such that the step of correcting the distortions of the initial image is implicit in the projection step.

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INVENTOR(S) : Christophe Moustier et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

12. The method according to claim 11, wherein the projection step comprises a first step of projecting the image points of the image sector onto a sphere portion and a second step of projecting, onto the initial image, the image points projected onto the sphere portion.

13. A computer program product recorded on a medium and loadable into the memory of a digital computer, the computer program containing code executable by the computer that is arranged to execute the steps of the display method according to claim 8.

14. A fish-eye objective lens having a constant field angle relative to its optical axis and comprising optical means for projecting the image of a panorama onto an image sensor, the fish-eye objective lens comprises optical means for projecting, without reducing the field of view, a distorted image that is not in the shape of a disk and which covers a number of pixels on an image sensor higher than the number of pixels that would be covered by a conventional image disk.

15. The fish-eye objective lens according to claim 14, having an image point distribution function that varies according to axes perpendicular to the optical axis of the objective lens, and which has a minimum spreading rate of the image along a first axis perpendicular to the optical axis and a maximum spreading rate of the image along at least a second axis perpendicular to the optical axis, such that an image delivered by the objective lens is expanded along the second axis.

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16. The fish-eye objective lens according to claim 15, having a distribution function that is not linear and that has a maximum divergence of at least  $\pm 10\%$  compared to a linear distribution function, such that an image delivered by the objective lens has at least one substantially expanded zone and at least one substantially compressed zone.

17. The fish-eye objective lens according to claim 14, comprising a combination of a group of lenses provided to capture a panoramic image according to a determined field angle and at least one cylindrical lens having an axis of revolution perpendicular to the optical axis of the objective lens.

18. The fish-eye objective lens according to claim 14, comprising optical means forming an apodizer.

19. The fish-eye objective lens according to claim 18, wherein the optical means forming an apodizer comprise at least one aspherical lens.

20. The fish-eye objective lens according to claim 14, comprising at least one distorting mirror.

21. The fish-eye objective lens according to claim 14, wherein the lens is a panoramic adapter lens and is provided to be placed in front of a still camera non-panoramic objective lens.

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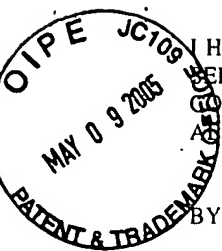
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BY:

*Don Marks*

DATE:

*May 5, 2005*

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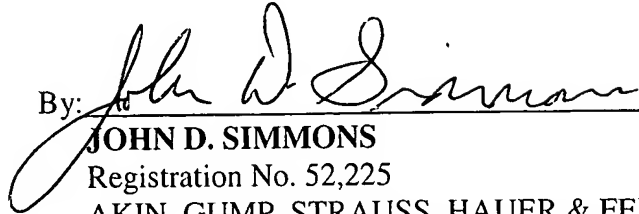
Issuance of a Certificate of Correction is believed appropriate and is respectfully solicited.

Please send the Certificate to the undersigned.

Respectfully submitted,

May 3, 2005  
(Date)

By:

A handwritten signature in dark ink, appearing to read "John D. Simmons", is written over a horizontal line.

**JOHN D. SIMMONS**

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In the claims:

Column 21, starting at line 22, please delete the claims in their entirety and replace with the following:

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 having a constant field angle relative to its optical axis, the image sensor being rectangular in  
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2. The method according to claim 1, wherein the fish-eye objective lens has an image point distribution function that varies according to axes perpendicular to the optical axis of the objective lens, and which has a minimum spreading rate of the image along a first axis perpendicular to the optical axis and a maximum spreading rate of the image along at least a second axis perpendicular to the optical axis, such that the image projected onto the image sensor is expanded along the second axis.

3. The method according to claim 2, wherein the first and the second axes of the objective lens are perpendicular and the image projected by the objective lens onto the image sensor is ellipsoidal in shape.

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4. The method according to claim 3, wherein the image sensor is arranged relative to the first and second axes of the objective lens so that the major axis of the ellipsoidal image coincides with an effective length of the image sensor.

5. The method according to claim 3, wherein the image sensor is arranged relative to the first and second axes of the objective lens so that the major axis of the ellipsoidal image coincides with a diagonal of the image sensor.

6. The method according to claim 2, wherein the objective lens has a distribution function that is not linear and that has a maximum divergence of at least  $\pm 10\%$  compared to a linear distribution function, such that the projected image has at least one substantially expanded zone and at least one substantially compressed zone.

7. The method according to claim 1, wherein the fish-eye objective lens comprises a combination of a group of lenses provided to capture a panoramic image according to a determined field angle and at least one cylindrical lens having an axis of revolution perpendicular to the optical axis of the objective lens.

8. A method for displaying on a screen an initial panoramic image captured in accordance with the method according to claim 1, the method comprising:  
correcting the distortions of the initial image.

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10. The method according to claim 9, wherein the initial image is ellipsoidal in shape and the corrected image has a diameter the size in number of pixels of which is at least equal to the size in number of pixels of the major axis of the initial ellipsoidal image.

11. The method according to claim 8, further comprising:

projecting, onto the initial image, image points of an image sector to be presented on the screen,

allowing the colors of the image points of the image sector to be presented on the screen to be determined,

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14. A fish-eye objective lens having a constant field angle relative to its optical axis and comprising optical means for projecting the image of a panorama onto an image sensor, the fish-eye objective lens comprises optical means for projecting, without reducing the field of view, a distorted image that is not in the shape of a disk and which covers a number of pixels on an image sensor higher than the number of pixels that would be covered by a conventional image disk.

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